

Remarks

By the foregoing Amendment, claims 1-19 are cancelled, and new claims 20-39 are presented. No new matter is added by this Amendment. Entry of the Amendment, and favorable consideration thereof, is earnestly requested.

Applicant greatly appreciates the Examiner's time and assistance in this matter. As discussed with the Examiner via teleconference June 21, 2006, new claims are being presented to more clearly distinguish the present invention from the cited art.

As suggested by the Examiner, the present claims recite that the virtual surface provided approximates the topography of the real surface. Accordingly, for the reasons discussed with Examiner, the present claims are patentable over Chen et al, U.S. Patent No. 5,776,050.

Applicant further submits that the present claims are also not anticipated or rendered obvious by Sumanaweera et al., U.S. Patent No. 6, 443,894, for several reasons.

First, the independent claim 1 requires "positioning an endoscope in a first viewing position relative to a real surface", and "using the endoscope to acquire an image of the real surface..." Sumanaweera, on the other hand, discloses the use of an ultrasound transducer to acquire the data that is used for the imaging. Applicant notes that this difference is significant, and it would not be an obvious modification for one skilled in the art to change the system of Sumanaweera to employ an endoscope to acquire the images.

This would require changing the fundamental design of Sumanaweera, which is ultrasound, and would be contrary to the basic objective of the reference, which is to improve the three-dimensional textural representation of structures in the body that are produced using ultrasound data. These two types of “imaging” are, of course, very different, as an endoscope utilizes a detector array to capture the reflected light waves off of an object that comprise an image, while an ultrasound system employs a transducer to transmit and receive acoustic pulses to determine the relative depths of the structure from which these echoes are received, and can then subsequently use this data to construct a picture of the object.

Additionally, Sumanaweera does not disclose “establishing a second viewing position relative to the real surface different than the position of the endoscope” and “determining position data indicating the difference between the position of the endoscope and the second viewing position.” Sumanaweera relates to noninvasive imaging, which collects surface and volume data and uses this data to create graphical representations of internal structures. Accordingly, unlike the present invention, it does not determine data that indicates the difference between a second viewing position and the position of a scope, and then use this position data, along with a mapped virtual surface, to render an image representing a view from this second position.

Applicant submits that it would not be an obvious modification for one skilled in the art to change the design of Sumanaweera in order to arrive at the claimed invention, as the Sumanaweera reference and the present invention have fundamentally different purposes.

Sumanaweera relates to noninvasive techniques used for diagnosis that construct graphical representations of internal structures in order to let a doctor "see" what he/she can't see with the naked eye. The present invention, on the other hand, is not concerned with whether the doctor can three-dimensionally image the surface—indeed, this is already being performed invasively with the endoscope. Rather, the object of the present invention is to cope with the problem of operator disorientation during endoscopic surgical procedures. This problem arises because the surgeon's image of the anatomy in his mind's eye from his vantage point is different from the image the endoscope is "seeing" from its vantage point. Once the surgeon inserts a surgical tool, such as a grasper, cutter, etc., into the operative site, the situation can get confusing. The tool is connected to the surgeon's hand, which moves in his reference frame relative to his head and his body, but the tool's movement is being imaged by the endoscope, which has a different vantage point, so the motion of the tool that the surgeon sees is actually motion relative to the endoscope reference frame, not his own. See, e.g., Fig. 7; Para. 25. Therefore, it is important to be able to represent the surface on which the surgeon is operating as if it were being viewed directly by the surgeon from his different viewpoint, rather than from the endoscope viewpoint..

For these same reasons, Sumanaweera would likewise not anticipate or render obvious dependent claim 2, which recites that at least the image acquisition, mapping, and image rendering steps are repeated when the endoscope is moved to a different position

relative to the real surface. As explained above, while this is important for the present invention in order to keep the user properly oriented as the scope moves within the body, the process of rendering images that account for the changing relative positions of the scope and user would be of no import to one skilled in the art using the system of Sumanaweera, which is simply concerned with providing a three-dimensional representation of the object “to better appreciate the internal structure.”

Applicant notes that independent apparatus claim 34 is patentable over the Sumanaweera reference for the same reasons stated above.

Additionally, independent method claim 37 even further clarifies distinctions between the present invention and the Sumanaweera reference. Specifically, claim 37 clarifies that basic three-dimensional imaging is achieved without the mapping by “inserting an endoscope into a cavity”, and further, that position data is determined and used to account for “the difference between the position of the endoscope and the position of the user.”

It is respectfully submitted that claims 20-39, all of the claims remaining in the application, are in order for allowance, and early notice to that effect is respectfully requested. As noted above, Applicant sincerely appreciates the Examiner’s assistance in this matter. Should the Examiner have additional concerns or comments, Applicant

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respectfully requests that the Examiner telephone David Aldrich at the number below to further discuss same.

Respectfully submitted,

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